Factors Affecting Anaemia among Pregnant Women in Tegalrejo Public Health Center

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Abstract—Prevalence of anaemia among pregnant women in Indonesia reaches to 37,1%, in DIY 16,09% and in Tegalrejo Public Health Center increased from 21,99% (2016) to 27,4% (2017). Anaemia impacts during pregnancy, childbirth, and infant. The research was aimed to identify factors affecting anaemia among pregnant women in Tegalrejo Public Health Center. This research was observational analytic research with case control design using secondary data that gained from medical records from January to December 2017. Study subjects were 172 pregnant women in Tegalrejo Public Health Center selected using purposive random sampling technique. Data analyzed using chi-square and logistic regression test. The results showed that most anaemia occurred in pregnant women with risky gestational age (81,4%), non-risky maternal age (73,3%), non-risky parity (86,0%), unemployed mothers (61,6%), who didn't has Chronic Energy Deficiency (68,6%), and who had higher education level (75,6%). Factors associated with anaemia among pregnant women were gestational age (p-value:0.025;OR:2,344), maternal age (p-value:0.035;OR:2,489), parity (p-value:0.031;OR:4,486), and CED (p-value:0.011;OR:2,822). CED was the influential factors of anaemia among pregnant women (OR=3.575,95%CI:1.609,7.944). Gestational age, maternal age, parity and CED were the factors of anaemia among pregnant women. CED was the most influential factors. Early detection and prevention of anaemia should be increased during ANC visits.

Keyword : Anaemia, Pregnancy, CED

1. INTRODUCTION

Anaemia is a condition in which the amount of hemoglobin in the blood is less than normal. [(1)]Anaemia affects 1.62 billion people worldwide. The prevalence of anaemia in pregnant women around the world ranges from 42% in average. The prevalence of anaemia in developing countries is 43% and in developed countries is 9%. Anaemia is estimated to contribute to more than 115.000 maternal deaths and 591.000 prenatal deaths globally per year.[(2)] The result of Indonesia Basic Health Research or Riskesdas in 2013 shows that the prevalence of pregnant women with anaemia in Indonesia is 37.1% [(3)] Whereas, the prevalence of anaemia of pregnant mother in Special Region of Yogyakarta or DIY in 2016 has increased into 16.09% from previous year which only reached 14.85%.[(4)] Based on data of anaemia prevalence in every regency / city in DIY during 2013-2016, anaemia in pregnant women tends to be high and always become the two highest prevalence in district / city of Yogyakarta each year. The number of pregnant women suffering from anaemia in Yogyakarta City per 2016 is mostly found in Tegalrejo Public Health Center (Puskesmas), in which there were 106 patients from the number of pregnant women whose Hb level were just measured and 482 patients had percentage of 21.99%.[(5)] The amount increased in 2017 in which there were 117 out of 427 pregnant women who experienced anaemia with percentage of 27.4%. In fact, the Fe tablet prescription coverage in Tegalrejo Public Health Center increased from 65.77% (317 of 482 pregnant women) in 2016 to 93.21% (398 of 427 pregnant women) in 2017.

Several studies had investigated the risk factors that have statistically significant correlation with anaemia in pregnant women. Obai et al's (2016) study on the prevalence of anaemia and its risk factors in pregnant women following ANC services in the Gulu and Hoima areas of Uganda showed that risk factors significantly associated with gravidarumanaemia were the level of education and occupation. Level of

education achieved was found to be associated with anaemia, low level of education associated with unemployment that led to poverty, one of the risk factors of anaemia during pregnancy.[6] Derso et al's (2017) study in Dera Region, Northwest Ethiopia showed the risk factors that increased the occurrence of gravidarumanaemia were residence, parity, economic status, adherence to iron tablets and maternal chronic energy shortage or CED status.[7]Anlaakuu et al (2017) study on anaemia during pregnancy and related factors at Sunyani City Hospital, Ghana showed that malaria infection, frequency of fish / snail consumption and gestational age at the first ANC check were factors related to anaemia in pregnant women [8] while Chowdhury et al (2015) study on factors related to anaemia in pregnant women in Dhaka City indicated that age, education, family income and mother residence significantly correlated with anaemia in pregnant women.[9]

Several studies about anaemia factors in pregnant women also had been conducted in Indonesia by Desi Ari MadiYanti et al (2015) research in Pringsewu Public Health Center showed that there was correlation between education, economic status and compliance of Fe tablet consumption with anaemia in pregnant women.[10]AtikPurwandari et al (2016) study at Tonsea Lama Public Health Center showed that there was a significant correlation between parity, maternal age, and ANC visit with anaemia level in the third trimester pregnant women.[11]

Study on the factors of anaemia in pregnant women had also been done in Java, one of them is a study by NoviyanaIdwiyani and Sri Tjahyani Budi Utami (2013) in Public Health Center of Kebayoran Lama Sub-district, South Jakarta. It showed that there was a significant correlation between sociodemography factors such as knowledge, education, attitudes and ANC visit including the frequency of ANC and iron tablet consumption.[12] Based on the results of these studies, it can be concluded that there are frequently occurring factors namely the factors of gestational age, maternal age, parity, mother's occupation, chronic energy deficiency or CED status, and education level. Anaemia affects the period of pregnancy, childbirth as well as the infant. Various adverse effects arise due to anaemia in pregnant women. Anaemia prevalence in pregnant women in Yogyakarta city is also high and always becomes the highest two from 2013-2016, especially in Tegalrejo Public Health Center where anaemia prevalence increases although the handling and prevention program of anaemia in pregnant women had been already implemented. The coverage of pregnant women Fe tablet even had increased drastically in 2017. Therefore, some efforts are needed to prevent and overcome the problem. One way to prevent and overcome it is by identifying the factors affecting anaemia prevalence in pregnant women.

2. MATERIALS AND METHOD

This study was a study with analytic observational type with case control research design which was conducted in May 2018 at Tegalrejo Public Health Center, Yogyakarta. The independent variables in this study were gestational age, maternal age, parity, mother's occupation, chronic energy deficiency or CED status and mother's education level, while the dependent variable was anaemia prevalence in pregnant women. Sampling was done using purposive random sampling technique involving 172 pregnant women who were assigned into 2 groups, which are 86 subjects in case group (anaemia) and 86 subjects in the control group (no anaemia). The data was taken from pregnant women's medical records who visited in 2017 with inclusion criteria was that pregnant women who had completed data on medical record (data of pregnant women concerning age of pregnancy, mother age, parity, occupation, chronic energy deficiency or CED status and education level), while the exclusion criteria was that pregnant women suffering from HIV / AIDS, malaria, tuberculosis, chronic kidney disease, gastrointestinal infections, thalassemia, sickle cell anaemia and parasitic disease contained in medical record. This study was analyzed using chi-square test and logistic regression test.

3. RESULTS AND DISCUSSION

Based on univariate test result that had been done (table 1), the result of pregnant women proportion who had anaemia was found more in group of pregnant women with risky maternal age, which was in the 1st and 3rd trimester with 70 pregnant women (81.4%), pregnant women without risky maternal age, aged 20-35 years old with 63 pregnant women (73.3%), pregnant women who had no risk parity (parity <3) were 74

pregnant women (86.0%), unemployed pregnant women, that was as many as 53 pregnant women (61.6%), pregnant women in the category of no chronic energy deficiency or CED (LLA ≥ 23.5 cm) that was as many as 59 subjects (68.6%), and pregnant women who had graduated from formal education at higher education level which comprised by 65 subjects (75.6%).

Table 1. Bivariate Test Result

Variable	Case N= 86		Control N= 86		*p-value*	OR	95% CI	
	n	%	n	%			*Lower*	*upper*
Gestasional Age								
Risky	70	81.4	56	65.1	0.025*	2.344	1.163	4.725
Not Risky	16	18.6	30	34.9				
Maternal Age								
Risky	23	26.7	11	12.8	0.035*	2.489	1.056	5.200
Not Risky	63	73.3	75	87.2				
Parity								
Risky	12	14.0	3	3.5	0.031*	4.486	1.219	16.518
Not Risky	74	86.0	83	96.5				
Occupation								
Unemployed	53	61.6	47	54.7	0.440	1.333	0.726	2.447
Employed	33	38.4	39	45.3				
Chronic Energy Deficiency Status								
Yes	27	31.4	12	14.0	0.011*	2.822	1.318	6.042
No	59	68.6	74	86.0				
Education Level								
Elementary	21	24.4	14	16.3	0.256	1.662	0.781	3.535
Secondary/Tertiary	65	75.6	72	83.7				
Total	**86**	**100**	**86**	**100**				

Bivariate analysis used in this study was chi square test. In this study, the determination of chi square magnitude used computer program with result interpretation if *p-value* (significant value of Chi Square test) was less than 0.05 (*p-value*<0.05). Based on table 1, it could be concluded that the results of the analysis with chi-square test for the correlation of several factors with anaemia prevalence in pregnant women in Tegalrejo Public Health Center in 2017 showed that the variable of gestational age (*p-value* = 0.025), maternal age (*p-value* = 0.035), parity (*p-value* = 0.031), and chronic energy deficiency or CED status (*p-value* = 0.011) had *p-value* < 0.05. It showed that there was a statistically significant correlation between maternal age, mother's age, parity and maternal chronic energy deficiency or CED status with anaemia prevalence in pregnant women at Tegalrejo Public Health Center in 2017.

The variable of gestational age had the value of OR = 2.344, which meant that pregnant women with risky pregnancy age (1st and 3rdtrimester) had an opportunity 2.344 times to experience anaemia compared to pregnant women who had no risky pregnancy age (2ndtrimester). Maternal age variable had the value of OR = 2.489, which meant pregnant women with risky maternal age (<20 years old or> 35 years old) had an opportunity 2.489 times to experience anaemia compared to pregnant women with no risky maternal age (20-35 years old). Pregnant women with risky parity (≥3) were 4.486 times more likely to have anaemia than women with norisky parity (<3) (OR = 4.486). The OR value of the chronic energy deficiency or CED status was 2.822 which indicated that women who experienced chronic energy deficiency or CED (LLA <23.5cm) had a chance 2.822 times to experience anaemia compared with women with not KEK (LLA ≥ 23.5 cm).

Based on the table, it could be seen that the result of analysis with chi square test for the correlation of occupation factor (*p-value* = 0.440) and education level (*p-value* = 0.256) with anaemia prevalence in pregnant women at Tegalrejo Public Health Center in 2017 was statistically not significant because each of these factors had *p-value*> 0.05.

Table 2. Multivariate Test Result

Variable	B	Exp.(B)	Sig.	95% CI	
				lower	*upper*
Pregnancy Age	1.004	2.728	0.009	1.282	5.801
Parity	1.780	5.930	0.009	1.552	22.663
Chronic Energy Deficiency or CED Status	1.274	3.575	0.002	1.609	7.944

After the chi-square test, then the logistic regression test was further developed as multivariate chi-square test. In the final analysis of logistic regression test, variables that influenced anaemia prevalence in pregnant women only were included significant variables (*p-value*<0.25). According to the result of multivariate test, it was found that anaemia in pregnant mother was significantly influenced by pregnancy age factor with *p-value* = 0.009, parity with *p-value* = 0.009, and chronic energy deficiency or CED status with *p-value* = 0.002 (*p-value*<0.05). Pregnant women with risky pregnancy age (1st and 3rd trimester) had a chance of 2.728 times to experience anaemia compared to pregnant women with no risky pregnancy age (2nd trimester). Regarding to parity variables, pregnant women with risky parity (parity ≥3) were 5.930 times more likely to have anaemia than pregnant women with no parity risk (parity <3). Regarding to chronic energy deficiency or CED status variable, pregnant women who experienced chronic energy deficiency or CED (LLA <23.5 cm) had an opportunity 3.575 times more likely to have anaemia than pregnant women who did not have chronic energy deficiency or CED (LLA ≥ 23.5 cm).

Table 1 showed that the correlation of the women's pregnancy age factor with anaemia prevalence in pregnant women was statistically significant (*p-value* 0.025). According to the result of multivariate test, the obtained *p-value* was 0.009 (<0.05). It revealed that anaemia prevalence in pregnant women in Tegalrejo Public Health Center in 2017 was statistically influenced by pregnancy age factor. Pregnant women with risky pregnancy age (1st and 3rdtrimester) had an opportunity of 2.728 times to experience anaemia compared to pregnant women with no risky pregnancy age (2nd trimester). (Exp. (B) = 2.728). The result of the study supported previous study conducted by Tadesse et al (2017) in Dessie City, Ethiopia. The result of the study indicated that there was a correlation between the pregnancy age factor with anaemia prevalence in pregnant women. Pregnant women in the first trimester had 2.07 times greater risk to suffer from anaemia than pregnant women in the second trimester (AOR = 2.07). This was caused by morning sickness and hemodilution at the beginning of this trimester. Similarly, pregnant women in the third trimester had 2.96 times greater risk to have anaemia than pregnant women in the second trimester (AOR = 2.96), which may be due to nutrients and maternal iron reserves in the trimester was more prominent for fetal development.[13] However, the result of this study differed from a study by of Siteti et al (2014) in Kenya which showed that the risk of anaemia in pregnant women was significantly higher in the second trimester (P = 0.0000). This occurred because the daily requirement of iron and folic acid was greater in the second trimester, so the iron reserve decreased and anaemia occurred. [14]

The result of the study indicated that the correlation between maternal ages with anaemia prevalence in pregnant women was statistically significant. Maternal age variable had the value of OR = 2.489 which meant pregnant women with risky maternal age (<20 years old or> 35 years old) had an opportunity 2.489 times to experience anaemia compared to pregnant women with no risky maternal age (20-35 year sold). Suryati et al (2011) stated that the younger and older the maternal age would affect the nutritional needs. Lack of nutritional fulfillment during pregnancy especially at age less than 20 years old and above 35 years old would increase the risk of anaemia.[15] The result of the study supported previous study by Ononge et al (2014) in Mpigi, Uganda which stated that the correlation between maternal age with anaemiaprevalencein pregnant women was statistically significant.[16] However, the result of the study did not support Obai et al's (2016) study indicating that the maternal age correlated with the anaemia in pregnant women.[6]

The result of the study indicated that there was a statistically significant correlation between parity with anaemia prevalence in pregnant women (*p-value* 0.031). According to the result of multivariate test, obtained *p-value* was 0.009 (<0.05). It suggested that anaemia prevalence in pregnant women was statistically affected by the parity factor. Pregnant women with risky parity (parity ≥ 3) were 5.930 times more likely to have anaemia than women with no risky parity (parity <3). (Exp. (B) = 5.930). The result of the study was in line with a study by Derso et al (2017) which also mentioned that parity was an independent factor of anaemia in pregnant women. Pregnant women with a parity of five or more are 4.20 times more at

risk of anaemia than women who had less than two parity. This was because pregnant women with high-parity could be more susceptible to bleeding and there was a syndrome of nutritional depletion. [7] Research by Al-Farsi et al (2011) indicated that compared with non-pregnancy circum stances, every pregnancy increased the risk of bleeding at before, during, and after delivery. Higher parity exacerbated the risk of bleeding. On the other hand, a woman with high parity had a large number of children, which meant the high levels of sharing the available food and other family resources that could interfere with pregnant women's food intake.[17] However, this study did not support previous study conducted by Ononge et al (2014) and Anlaku et al (2017) which stated that the correlation between parity and anaemia prevalence in pregnant women was not statistically significant.[8,16]

The result of the study indicated that the correlation between occupational factor with the anaemia in pregnant women was not statistically significant because the *p-value* was 0.440 (*p-value* => 0.05). The result of the study was consistent with the study by Melku et al (2014) which said that the correlation between mother's occupation and the anaemia in pregnant women was not statistically significant.[18] However, it was in contrast with the other study by Idowu et al (2005) about anaemia in pregnancy in Africa which suggested that unemployed pregnant women were significantly correlated with anaemia prevalence because unemployed pregnant women could not make ANC visits earlier and consumed less nutritious foods.[19]

The result of the study also indicated that the correlation between chronic energy deficiency or CED status factor with the anaemia in pregnant women was statistically significant (*p-value* 0.010). In accordance to the result of multivariate test, obtained *p-value* was 0.002 (<0.05). It showed that the anaemia in pregnant women at Tegalrejo Community Health Center in 2017 was influenced by chronic energy deficiency or KEK status factor. Pregnant women who had chronic energy deficiency or CED (LLA <23.5 cm) had an opportunity to be 3.575 times more likely to have anaemia than women who did not have chronic energy deficiency or CED (LLA ≥ 23.5 cm) (Exp. (B) = 3.575). The result of this study supported previous study conducted by Derso et al (2017) who said that anaemia had 4.97 times greater risk to occur in pregnant women who had chronic energy deficiency or CED than the non- CED.[7] This study also supported the result of study by Alene et al (2014) which stated that pregnant women with LLA <23 cm could increase the risk of anaemia. In contrast, in pregnant women with LLA ≥23 had a 59% lower risk for anaemia. It could be explained that, in reality, pregnant women with nutritional deficiencies were more likely to have micronutrient deficiency. Therefore, iron deficiency could be more prone to anaemia.[20]

The results of this study indicated that the correlation between mother's education level with the anaemia in pregnant women was not statistically significant (*p-value* 0.256). It was in contrast to Siteti et al's (2014) study, which said that education level had statistically significant correlation with the anaemia in pregnant women (*p-value* = 0.0447). The result of study explained that mothers with higher education had significantly lower risk of anaemia. This could be caused by mothers with higher education were more open to new ideas and public health promotion, as well as having healthy lifestyles.[14] Nevertheless, the result of this study supported the result of previous study conducted by Ononge et al (2014) in Mpigi, Uganda, which stated that the correlation between educational level factor and anaemia in pregnant women was not statistically significant (*p-value* = 0.437).[16] This study also corresponded to previous study conducted by Alemu, Tadesse and MelakuUmeta (2011) who said that there was no statistically significant correlation between mother's education level and anaemia in pregnant women.[21] Another result of study that showed a non-significant correlation between educational level factor and anaemia occurrence was also obtained from study by Getahun et al (2017) with *p-value* 0.999. [22]

4. CONCLUSION

Anaemia in pregnant women was more prevalent in a group of women with risky gestational age, non-risky maternal age, non-risky parity, unemployed mothers, and mothers at the upper / higher education level. Gestational age, maternal age, parity, and chronic energy deficiency or CED status were factors that affected anaemia. Early monitoring and early detection of anaemia risk factors needed to be improved so that they could be diagnosed early and could get immediate treatment, especially in chronic energy

deficiency or CED which was the affective factor of anaemia among pregnant women.

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